

Update of AFCI Capture Cross Section Measurements

at **LANSCE**

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DANCE Collaboration

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Joint AFCI/GenIV
Physics Working Group Meeting
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LANSCE

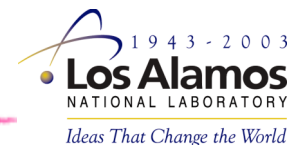
1943 - 2003
Los Alamos
NATIONAL LABORATORY
Ideas That Change the World

LANSCCE Capture Cross Section Measurements Overview

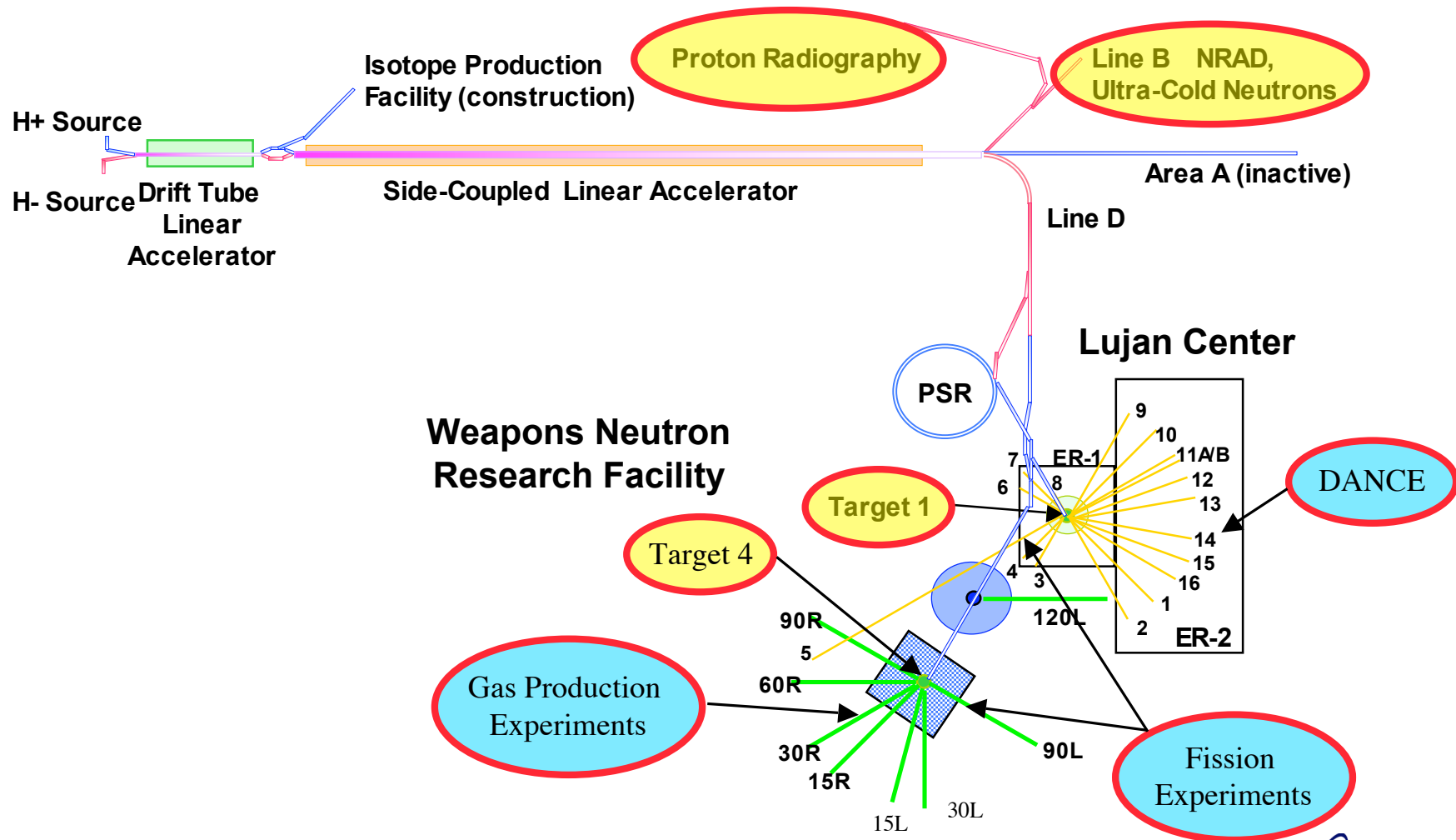
- LANSCE Facility
- Update of Capture Msmts
 - $^{237}\text{Np}(n,\gamma)$
 - $^{242}\text{Pu}(n,\gamma)$
 - $^{240}\text{Pu}(n,\gamma)$



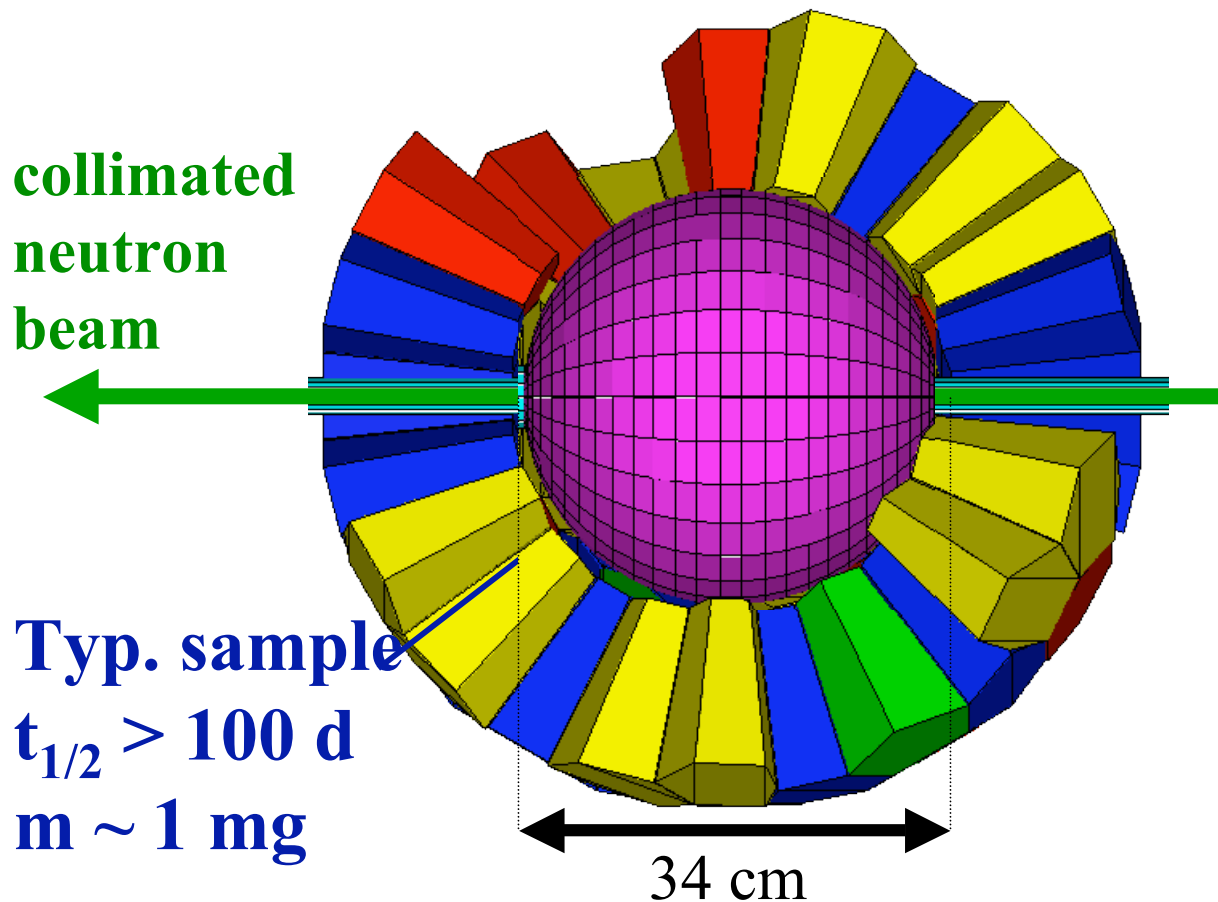
LANSCCE



Nuclear Science (NS) research is performed at many experimental areas at LANSCE



Detector for Advanced Neutron Capture Experiments



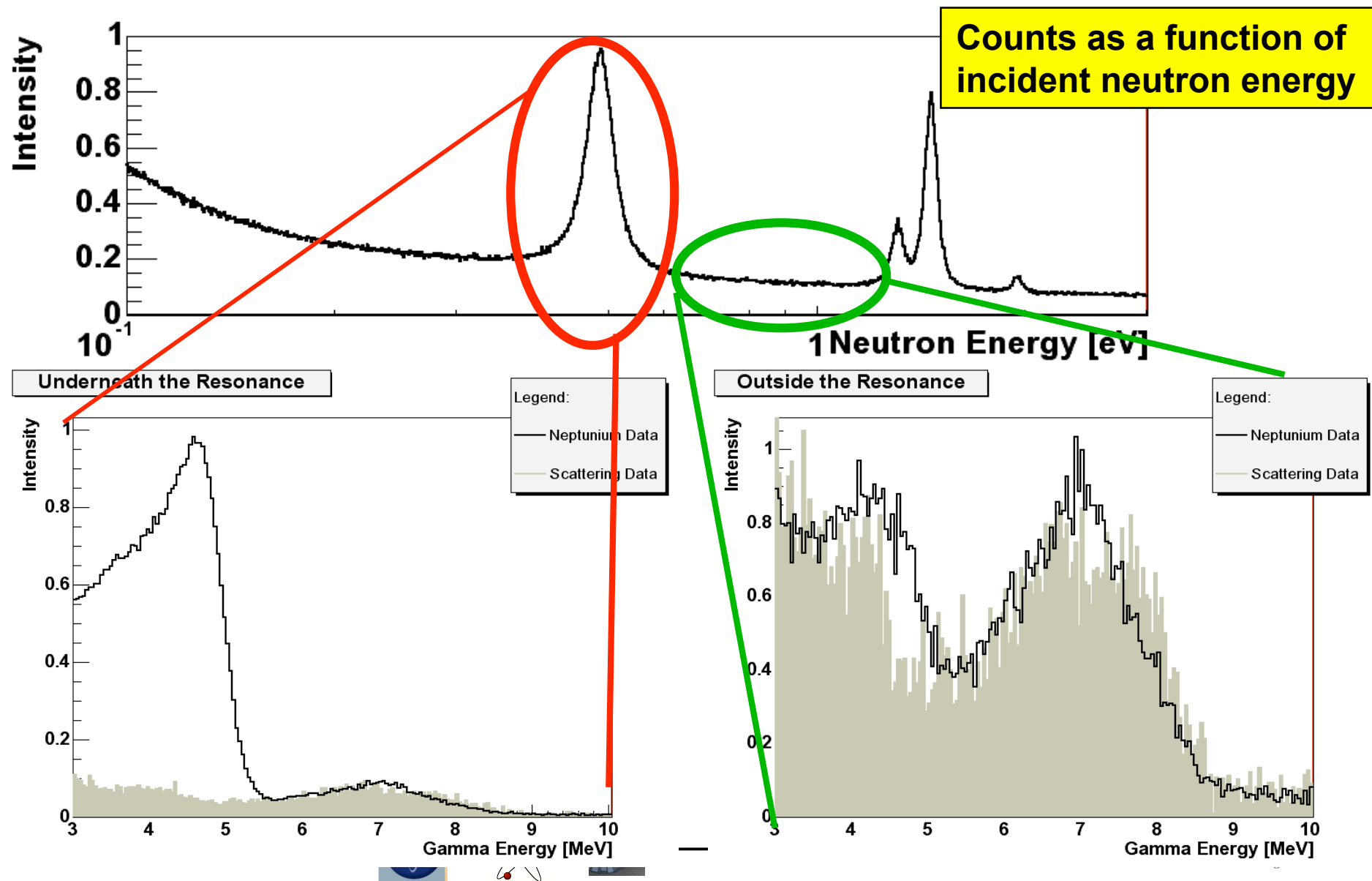
neutrons:

- spallation source
- thermal .. 500 keV
- 20 m flight path
- 3×10^5 n/s/cm²/decade

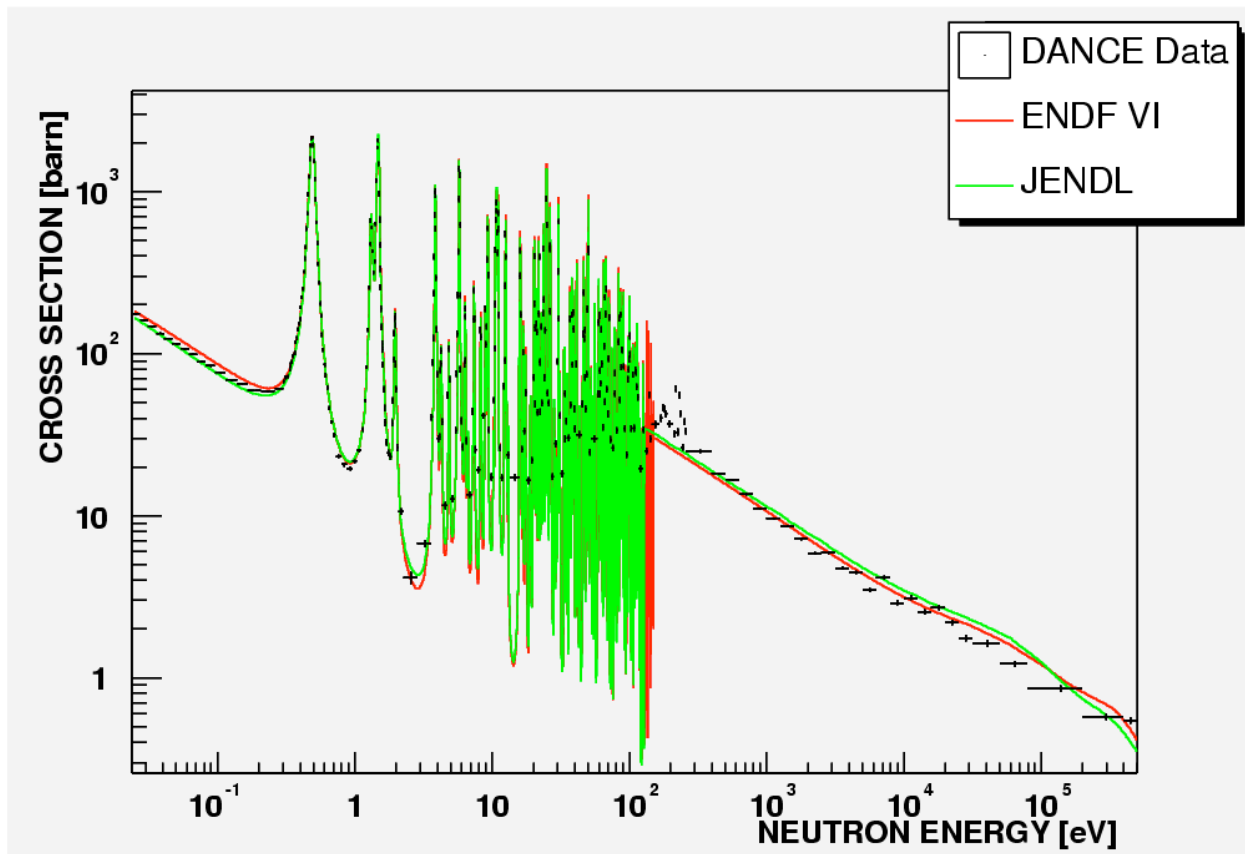
g-Detector:

- 160 BaF₂ crystals
- 4 different shapes
- $R_i=17$ cm, $R_a=32$ cm
- 7 cm ⁶LiH inside

Background Subtraction - example with ^{237}Np Data



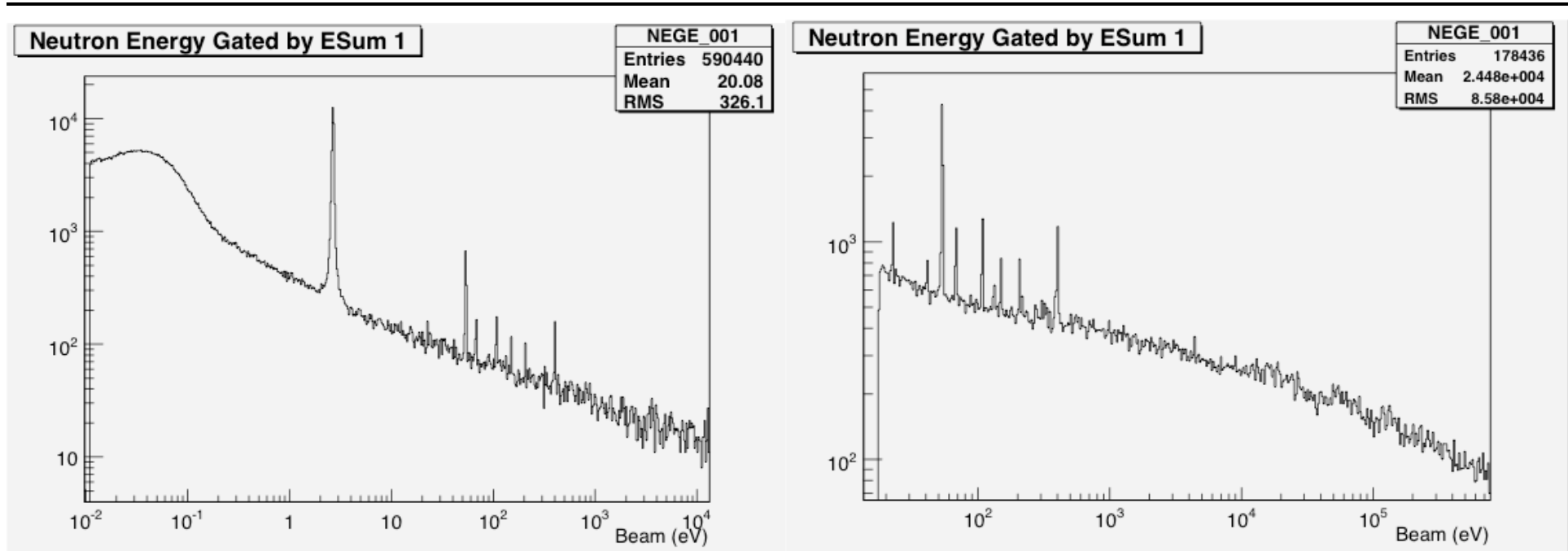
^{237}Np Status: Final results, statistical uncertainties



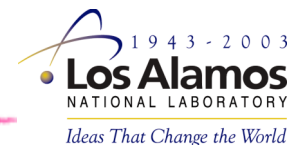
Measurement complete and sent to T-16

Results submitted to *Physics Review Letters*

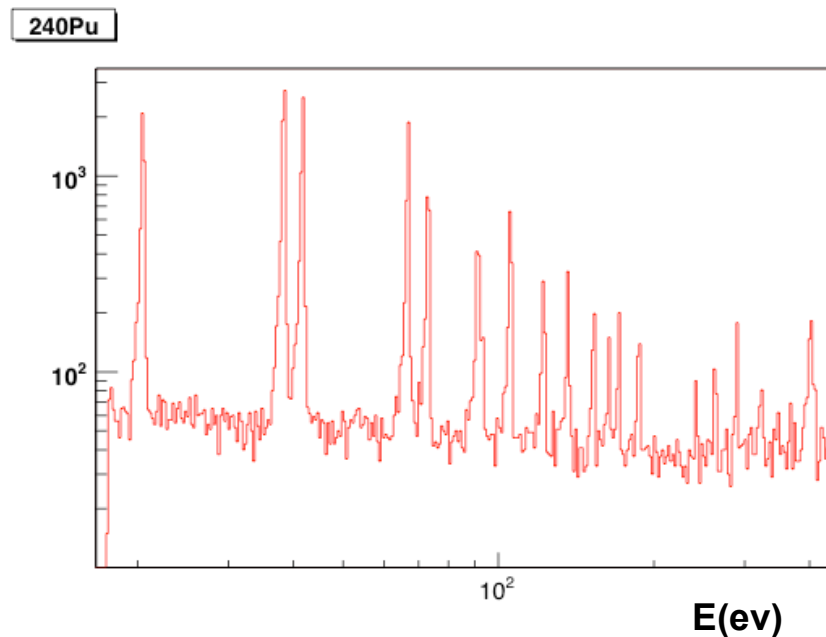
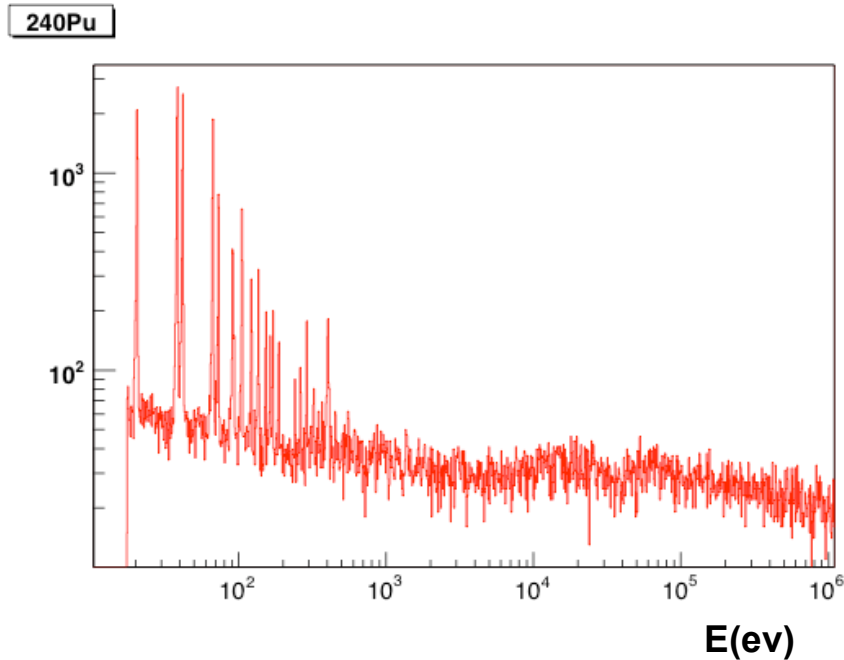
Pu-242 Capture Data Collected (analysis begins this month)



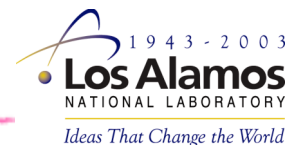
- Plots show 20 minutes worth of data
- took 4 hours below 10 keV
- 6 days for energies up to 1 MeV
- 6 days of background runs



Preliminary Pu-240 Capture Data Collected



- Preliminary Pu-240 data collected before end of run
- 6 days of data accumulated
- minimum 6 more days required next run cycle



AFCI Capture Measurement Summary

- **$^{237}\text{Np}(n,\gamma)$ measurement complete**
 - Data delivered to T-16
 - Paper submitted to PRL
- **$^{242}\text{Pu}(n,\gamma)$ data collected**
 - Aaron Couture to begin analysis
 - Measurement expected to be completed on time
- **$^{240}\text{Pu}(n,\gamma)$ preliminary data taken**
 - Several more days of data required to complete
 - Next LANSCE run cycle will start May 2006
 - Completed measurement expected on time

